

REMARKS

Applicants have amended claims 20 and 29 to remove the objected to language noted by the Examiner in the rejection of these claims under 35 USC 112. The canceled language was redundant and rendered the rejected claims indefinite as noted in the Official Action. The cancellation of the objected to language overcomes this rejection and therefore it is most respectfully requested that the rejection under 35 USC 112 be withdrawn. The claims now remaining in the application are claims 20-36. Applicants most respectfully submit that all the claims now present in the application are in full compliance with 35 U.S.C. 112.

The rejection of claims 20-23, 25, 27-32, 34 and 36 under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. in view of Kubo et al. has been carefully considered but is most respectfully traversed.

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

In the Official Action it is urged that with respect to claims 20 and 29 Matsuoka et al. show (see cover Figure and column 4, line 49 et seq.) a detector in a BJT on a common substrate is said to be shown with an air insulation between a collector contact layer 2 and collector layers 3-7. It is urged that Matsuoka et al. show the InGaAs material system. While Applicants do not disagree with this statement, the presently claimed invention relates to a single chip structure of silicon germanium and not InGaAs as in the primary reference. It is also urged in the Official Action that Kubo et al. show at column 4, line 49, a **similar** device where the structure is SOI, with detector 27 and BJT 28 trench isolation 5 between the devices and the base/emitter is SiGe. There is no teaching of the equivalence of these devices and there is no motivation to one of ordinary skill in the art to look to combine the teaching absent Applicants' disclosure which is impermissible hindsight. In re Fritch, 23 USPQ 1780, 1784(Fed Cir. 1992) ("It is impermissible to engage in hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps."). Therefore, the conclusion that it would have been obvious to form the Matsuoka et al. device with the Kubo et al. structure to take advantage of the speed and power capabilities of the Kubo et al. materials and structure is unwarranted and the combination of references does not render the claims prime facie obvious.

More specifically, in the present application, there is an advantage in manufacturing two elements of adjustable higher-response Silicon Germanium photodetector and high-speed transistor under a single process at the same time to reach a kind of one single wafer technology. Further, this structure has not been yet patented, so it is accurate that the present invention is not obvious.

Although the present application and the '117 reference are OEICs (Optical-Electronic Integrated Circuits) technology, the P-i-N structure of the claim in '117 is thoroughly different from the MQWs or SIs structure of the claim in the present application. Applicants wish to point out that the manufacturing way of the P-i-N structure of the '117 is more complex or there is some loss of influence on high-speed transistor. In addition, the structure of the '117 made of the different membrane material of semiconductor is different from the way of changing Ge's content of the presently claimed invention. That is, the way of adjusting or detecting the wavelength of the

present application is surely different from the '117 reference and is not combinable with the teachings of the secondary reference as would be understood by one of ordinary skill in the art to which the invention pertains.

A kind of the phototransistor or photodiode having reflective and improved Silicon-germanium in the '614 reference neither forms the magnifying effect of photovoltaic nor achieved the goal of higher-response as the present application.

A kind of simple Silicon Germanium phototransistor or photodiode in the '860 reference also neither formed the magnifying effect of photovoltaic nor achieved the goal of higher-response as the present application.

A kind of improved structure of bipolar transistor in the '833 reference does not have a directed relationship from the present application. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 24 and 33 under 35 U.S.C. 103 as being unpatentable over Matsuoka et al. in view of Kubo et al. and further in view of Sugiyama et al. has been carefully considered but is most respectfully traversed.

In the Official Action it is urged that neither the Matsuoka et al. nor Kubo et al. show a superlattice but Sugiyama et al. show a similar device. Specific reference is made to Figure 17 and column 14, line 10 et seq.). It is concluded that it would have been obvious to modify the basic device to include the superlattice to provide operation at the communication wavelength and since the advantage of the device is also that of inexpensive silicon processing to be used it would be obvious. However, this clearly relies upon the teachings of Applicants' specification which may not be used to provide the necessary motivation to modify the reference and arrive at the claimed invention. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 26 and 35 under 35 U.S.C. 103 as being unpatentable over Matsuoka et al. in view of Kubo et al. and further in view of Jang has been carefully considered but is most respectfully traversed.


It is urged that the base and emitter of Kubo et al. are SiGe but neither Matsuoka et al. nor Kubo et al. show the thickness of the emitter. Jang show a BJT where the thickness of the emitter is 0.1 micron which is greater than 10 nm. It is concluded that it would have been obvious to use the thickness since it is known to be functional.

However, the functionality aspect represents nothing more than obvious to try which is not the standard of obviousness under 35 U.S.C. 103. Accordingly, it is most respectfully requested that this rejection be withdrawn.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all the claims now present in the application are most respectfully requested.

Respectfully submitted,

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Marked-Up Version Showing Changes Made

IN THE CLAIMS:

Please replace claims 20 and 29 with the following amended claims 20 and 29.

20(Amended). A single-chip structure of silicon germanium photodetectors and high-speed transistors comprising:

- a substrate;
- a phototransistor, which is formed on a side of the substrate;
- a high-speed bipolar transistor which is located on the opposite side of the phototransistor on substrate; and

- a separated insulation-layer which separates the phototransistor and the high-speed bipolar transistor[, consisting of the above components], a single-chip structure of the phototransistor and the high-speed bipolar transistor can be completely implemented on a same substrate; and

- wherein the phototransistor and high-speed bipolar transistor structure includes:
 - a composite collector layer which consists of a collector layer and a photo-absorbing layer, wherein the photo absorbing layer is formed on the collector layer;
 - a base layer, located on the composite collector layer; and
 - an emitter layer, formed on the base layer.

29(Amended). A single-chip structure of SiGe photodetectors and high-speed transistors comprising:

- a substrate;
- a photodiode, which is formed on a side of the substrate;
- a high-speed bipolar transistor which is located on the opposite side of the photodiode on substrate; and

- a separated insulation layer which separates the photodiode and the high-speed bipolar transistor, [consisting o the above components,] the photodiode and the high-

speed bipolar transistor can be completely implemented by using a single-chip structure;

wherein the photodiode and high-speed bipolar transistor structure includes;

a composite collector layer consists of a collector layer and a photo-absorbing layer, wherein the photo-absorbing layer is formed on the collector layer;

a base layer, formed on the composite collector layer;

an emitter layer, formed on the base layer of the high-speed bipolar transistor, but the photodiode has no emitter layer.